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NOTES ON CLIMATOLOGY.

BY

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THE DEPOPULATION OF KANSAS, NEBRASKA, AND COLORADO.—One of the most pathetic incidents in the history of the settlement of our country west of the Mississippi River was that connected with the sudden increase in the population of portions of that region about fifteen years ago, and the suffering and impoverishment which the new settlers had to face in the succeeding years. During the period from 1886 to 1889 there was a sudden "boom" in western Kansas and Nebraska and eastern Colorado, resulting from a large increase in land values which followed a succession of unusually rainy seasons. There was a very rapid gain of population, stimulated somewhat—how far it is impossible to determine with accuracy—by dishonest representations of the climatic conditions made by unscrupulous land-dealers. The increase in population in Kansas has recently been considered by Gannett (see this BULLETIN, No. 5, 1900), who has shown that in 1885, at the beginning of the "boom," Kansas had a population of 1,268,530, while in 1888, near the crest of the "boom," the population numbered 1,518,553. A number of dry seasons followed, and the new settlers were literally starved out. In the midst of much suffering, the country was quickly depopulated again. In 1890, the population of Kansas had been reduced to 1,427,096; and in 1895 it was only 1,333,734. The State thus gained nearly 250,000 inhabitants in three years, and later lost nearly 200,000. Similar conditions obtained in the two Dakotas. This exodus of most of the new "boom" settlers naturally resulted in the abandonment of villages and farm-houses everywhere over this district, and one of the most pathetic sights which the traveller may look upon to-day, in his journey across the region from the 100th meridian to the foot-hills of the Rocky Mountains, is the abandoned and ruined house, or farm, or stable, built in the days of the "boom," when prospects were of the brightest, and left when the family was forced to go because the deficiency of rainfall made it no longer possible to live there. A graphic description of the present aspect of the "boom" country is given by J. E. Payne in BULLETIN 59, December, 1900, of the Agricultural Experiment Station of the Agricultural College

of Colorado, under the title *Field Notes from Trips in Eastern Colorado*. Of many of the towns which sprang up like mushrooms, and aspired to become large cities, railroad centres, or county seats, there are to-day left only a few cellars and two or three scattering houses. On the site of Arickaree City one store building now stands, and is the home of four persons, while the Arickaree post-office is on a ranch eight miles away. In the neighborhood of Lindon nearly all the land for miles around was once taken up, while to-day one may drive for ten or twenty miles without seeing a house:

"The site of old Lindon is now marked by a few heaps of earth and a few holes in the ground. . . . At Harrisburg, one family still lives. Thurman, also called Stone City, once had two banks, and two railroads were surveyed through it during 'boom' times. Now one family lives in Thurman. But a colony of hardy Menonite farmers still holds claims near enough together to make lanes necessary. Two lanes cross at Thurman post-office."

The farmers who are now living in the region have come to see that there is not enough rainfall for successful agriculture. They have turned their attention chiefly to stock-raising, but usually also raise some grain, and always manage to produce enough rough forage for their cattle. Thus, after the "boom" and the futile attempt to turn the debatable ground west of the 100th meridian into a farming country, the possibilities of the region, under the control of climate, have come to be clearly recognized. The future will see no more of those pathetic struggles on the part of man to claim solely for agriculture a region which the climatic control has decreed shall be chiefly a grazing country.

THE DISTRIBUTION OF RAINFALL OVER THE LAND.—In 1882, Loomis published the first good map of the mean annual rainfall of the world. This appeared in the *American Journal of Science*, Third Series, Vol. XXIII, Jan., 1882, under the title *Contributions to Meteorology, Sixteenth Paper*. In January, 1883 (*Amer. Journ. Sci.*, 3d Series, Vol. XXV), a second edition of the same map appeared, as the eighteenth paper of the *Contributions to Meteorology*. Loomis's map was used by Hann in his *Atlas der Meteorologie* (Berghaus' Physikalischer Atlas. Abtheilung III. Gotha, 1887), and a revised form of it was published by Buchan in the *Scottish Geographical Magazine* for 1887. In 1889, Loomis himself published a revised form of his original map in Chapter III of the revised edition of the *Contributions to Meteorology*. In 1898, Supan brought out a new map of mean annual rainfall, and four charts showing the rainfall of the four seasons (*Die Verteilung der Niederschläge auf der*

festen Erdoberfläche; Petermanns Mitteilungen, Ergänzungsheft No. 124. Gotha, 1898), and Dr. A. J. Herbertson also published a new map of mean annual rainfall. The latter is reproduced in Bartholomew's *Atlas of Meteorology* (1899).

The most complete of all publications on rainfall, as well as the latest, is the recent one by Dr. Herbertson, of the School of Geography at Oxford University, entitled *The Distribution of Rainfall over the Land* (Roy. Geogr. Soc., London, 1901. Pp. 70. Maps 13. Pl. I). Dr. Herbertson has for the first time drawn *monthly* rainfall maps for the world. In doing this he has gone ahead of all previous students of the subject, and has made one of the most important contributions to meteorology of recent years. These monthly rainfall maps were reproduced, on a small scale, in the *Atlas of Meteorology* (1899), but are far more useful on the large scale of the present publication. Dr. Herbertson rightly points out that seasonal rainfall maps are unsatisfactory, for the value of the seasons as a basis for constructing maps of this sort differs greatly in different countries, and three months are often too long a period to illustrate the seasonal peculiarities of rainfall.

The maps contained in *The Distribution of Rainfall over the Land* show the lines of equal rainfall for 25, 50, 100, 200, 300 and 400 mm. The differences in the lengths of the months are allowed for, the actual values used for the isohyetal lines being the nominal values multiplied by the number of days in the month, and divided by one-twelfth of the number of days in the year. Thus, the lines on the February map marked 100 mm. really represent an actual rainfall in February of 92 mm. Every isohyetal line has, therefore, two meanings. The value given on the map is that for the month reduced to one-twelfth of a year. The same line represents an actual rainfall during that month somewhat less or more than its nominal value, according to the length of the month. The maps are colored in seven different shades or colors. There are five shades of the conventional "rainfall" blue, one of a lightish pink, and one of a light brown. There is a separate discussion of the distinctive features and peculiarities of the rainfall of each month, the earth's surface being divided, for the purpose of systematic description, into three regions, viz: the sub-equatorial baric trough or depression; the constant or steady or trade-wind system of winds, and the north and south temperate storm-wind systems.

Dr. Herbertson's valuable series of charts, and his brief but pointed discussions of them, make a much more detailed study of the world's rainfall possible now than ever before. This monograph is assured a hearty welcome and effective use. The bibliography

at the end of the report, of general works and publications on special areas, adds materially to the value of the paper.

THE CLIMATE OF THE ARGENTINE REPUBLIC.—Of the South American republics, Argentina is far and away the foremost in point of view of organized meteorological work. The Argentine meteorological service was inaugurated by the late Dr. B. A. Gould, and has, under the present able directorship of Mr. Walter G. Davis, attained a high rank among the weather services of the world. Volume after volume of meteorological tables and discussions have been sent out from the Meteorological Office at Córdoba. As the number of stations has been increased year by year, and more and more data have been collected from the sparsely settled portions of the country, the material has rapidly been accumulating for a complete climatologic study of Argentina. Such a study—an admirable one in every way—has recently been published as a part of the second census of the Argentine Republic (Buenos Aires, 1898. Tomo I. Cuarta Parte. *El Clima de la República Argentina, por Gualterio G. Davis*, pp. 259–381). Unfortunately, this report is, for all practical purposes, buried. No reprints of it have been struck off, and it is still unknown to meteorologists at large. Mr. Davis has, in his monograph (which is one of the most important climatologic publications issued in recent years), given an excellent presentation of the chief climatic features of Argentina. The country itself, because of its great north and south extent, is an extremely interesting one, including, as it does, a great variety of climates between its northern boundary, beyond the Tropic of Capricorn, to its southern extremity, at latitude 55° S. Great differences of temperature and precipitation naturally occur over this extended territory, and the products of the soil and occupations of the people vary with the varying climatic conditions. All the important elements of the climate are tabulated and discussed. A large number of graphic representations show the correlations between these various elements at some of the more important stations. Finally, a series of charts, based on the latest and most complete data available, shows the temperature, pressure and winds for the four seasons and for the year, and the mean annual rainfall. These charts show, for the first time, the distribution of these elements over this southern portion of South America, in detail, and on the basis of the reliable data collected by the Argentine Weather Service. A reprint of Mr. Davis's monograph in Spanish or, better still, in English would be a welcome addition to the meteorological libraries of the world.